IOANNIS PAVLIDIS, ET AI
H0002443-02
John G. Shudy, Jr., Attorney
System & Method Using Thermal Image
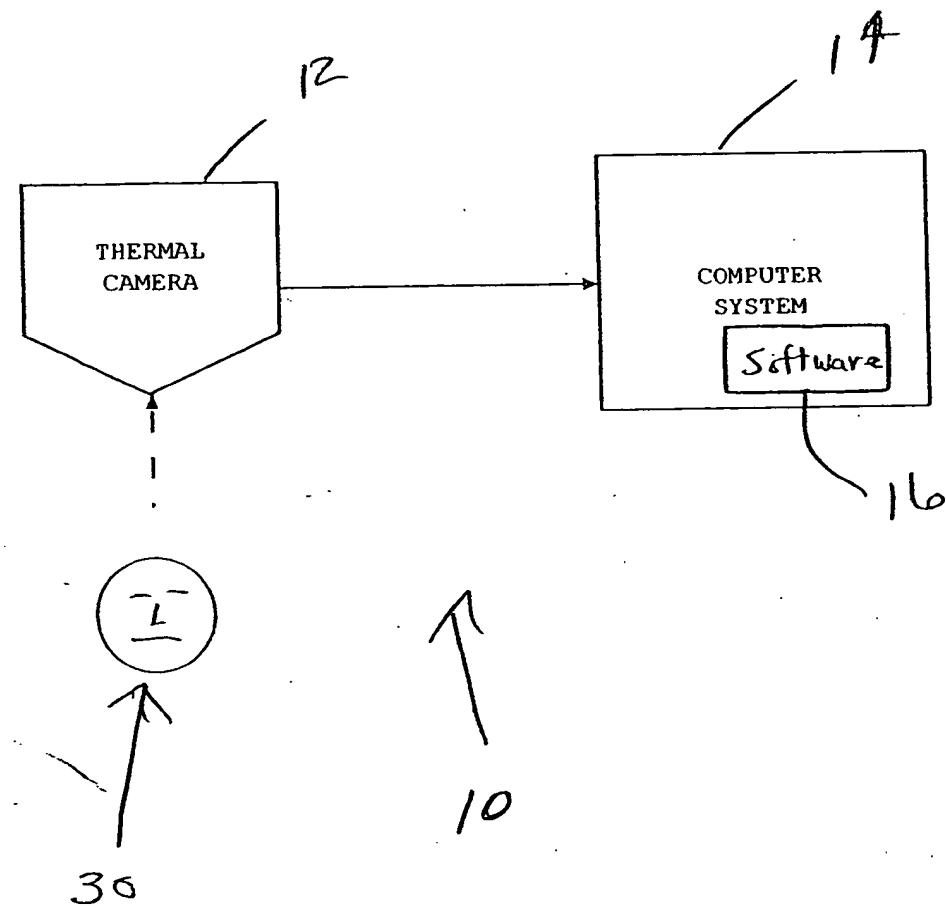Analysis & Slope Threshold Classification
for Polygraph Testing

FIGURE 1

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FIGURE 2

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for Polygraph Testing
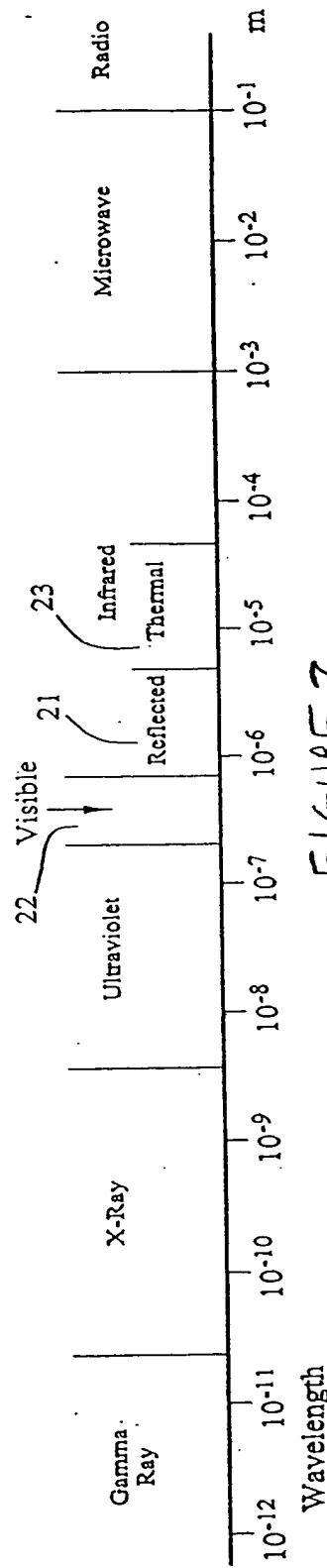
FIGURE 3

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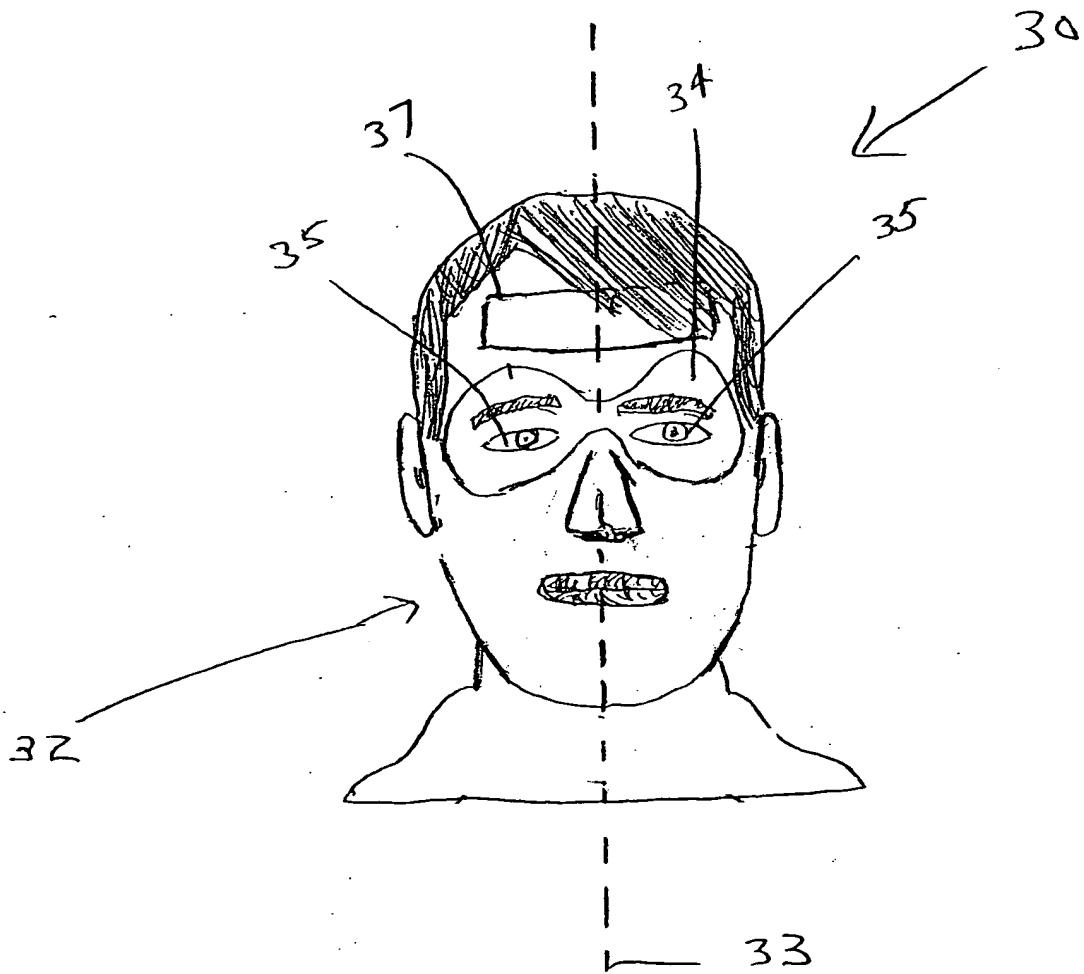for Polygraph Testing

FIG. 4

50

52

THERMAL IMAGE DATA
OF AT LEAST A
REGION OF A FACE
OF A PERSON

TRANSFORM THE
THERMAL IMAGE DATA
TO BLOOD FLOW
RATE DATA

54

CLASSIFICATION OF THE
PERSON AS DECEPTIVE
OR NON-DECEPTIVE
BASED ON THE BLOOD
FLOW RATE DATA

56

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Analysis & Slope Threshold Classification
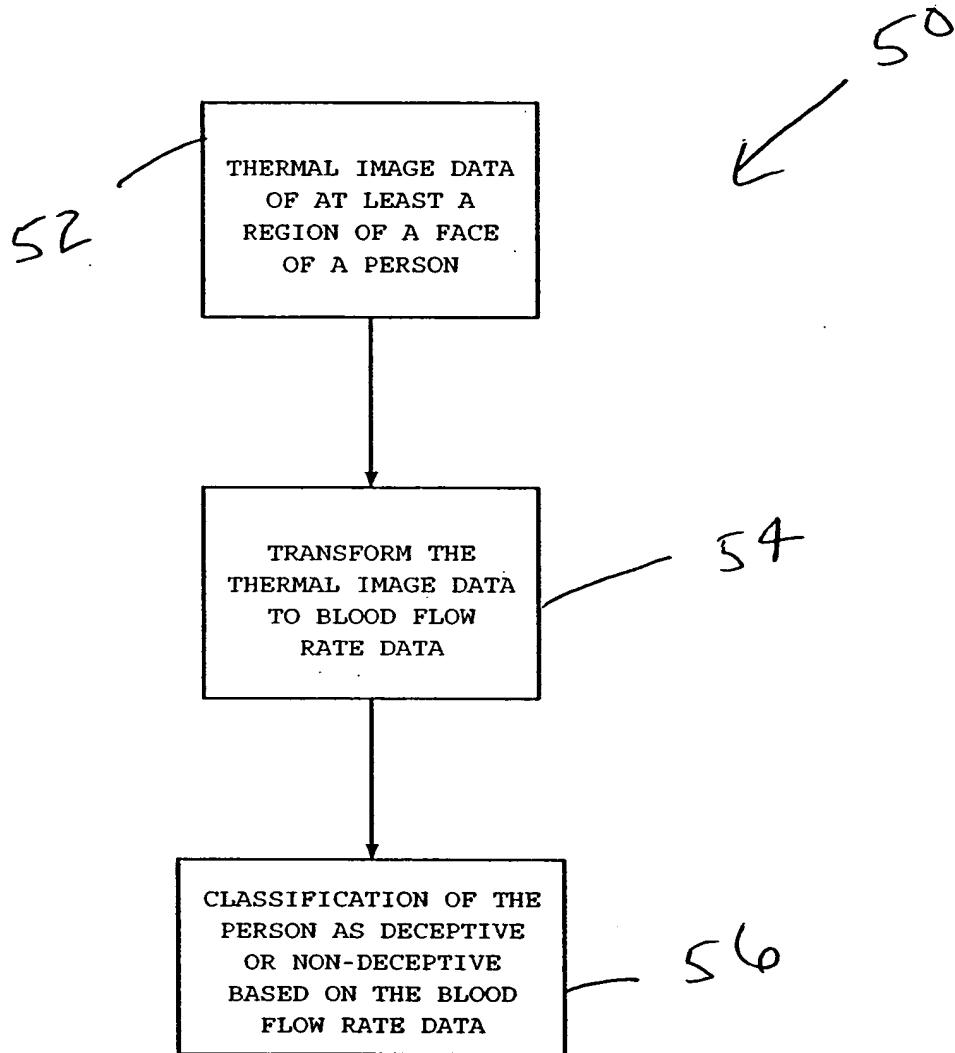for Polygraph Testing

FIG. 5A

FIG. 6A

60

62

FIG. 5B

FIG. 6B

60

62

64

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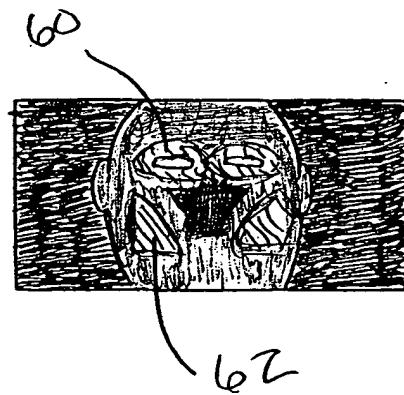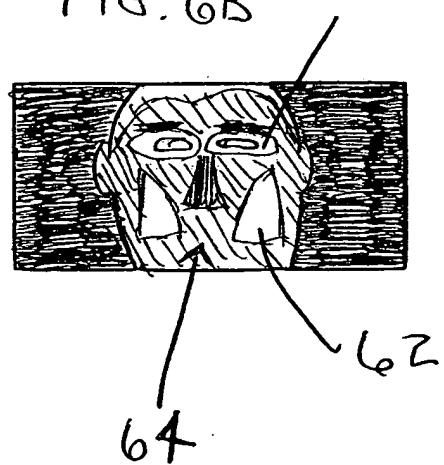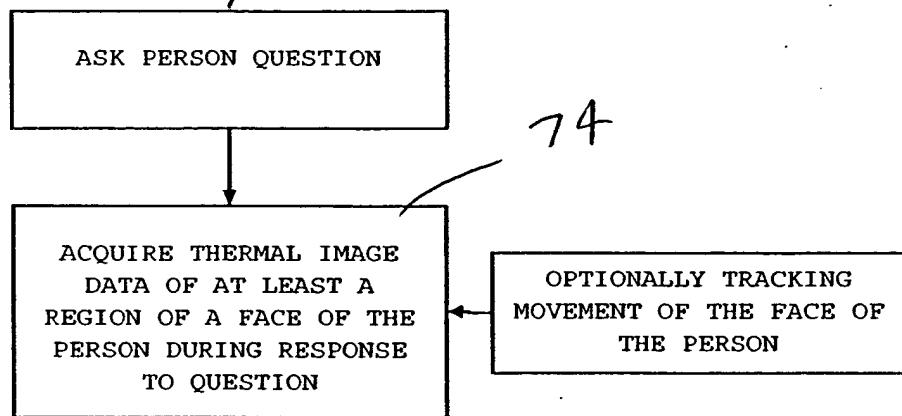Analysis & Slope Threshold Classification
for Polygraph Testing

FIG. 7

72

ASK PERSON QUESTION

74

ACQUIRE THERMAL IMAGE
DATA OF AT LEAST A
REGION OF A FACE OF THE
PERSON DURING RESPONSE
TO QUESTION

76

OPTIONALLY TRACKING
MOVEMENT OF THE FACE OF
THE PERSON

FIG. 8

86

PROVIDE CLASSIFICATION
OF PERSONS BASED ON
BLOOD FLOW RATE DATA

82

PROVIDE ONE OR
MORE OTHER
PHYSIOLOGICAL
PARAMETERS (e.g.,
parameters
obtained by
invasive methods)

84

PROVIDE
CLASSIFICATION
BASED ON OTHER
PARAMETERS

CONFIRM
CLASSIFICATION
DETERMINED VIA ONE
METHOD WITH THAT
OF THE OTHER

88

FIG. 9

94

PROVIDE
BLOOD FLOW RATE DATA

92

PROVIDE ONE OR MORE OTHER
PHYSIOLOGICAL PARAMETERS
(e.g., parameters obtained by
invasive methods)

CLASSIFICATION OF PERSON
AS DECEPTIVE OR
NON-DECEPTIVE BASED ON
BOTH BLOOD FLOW RATE DATA
AND OTHER PARAMETERS

96

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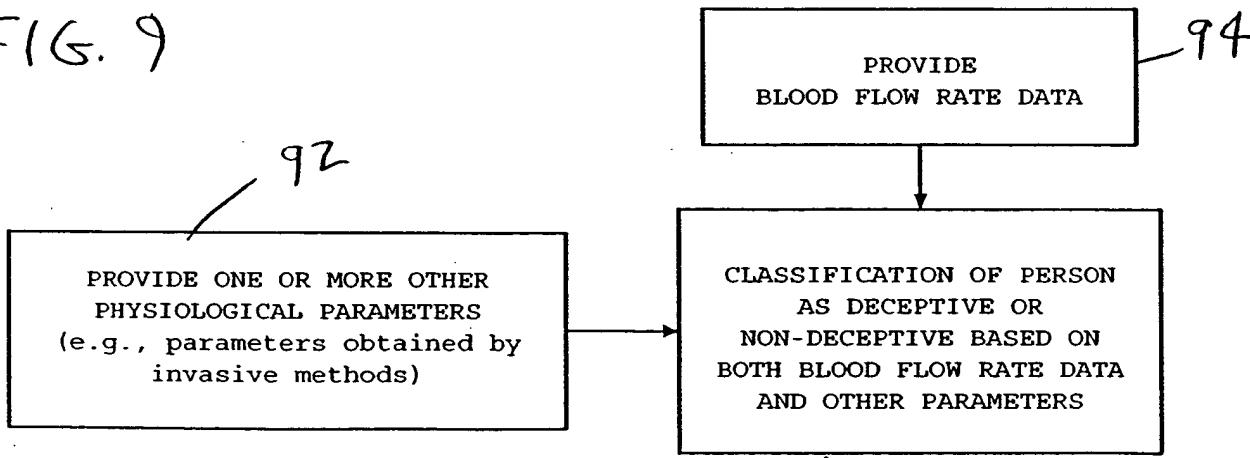System & Method Using Thermal Image
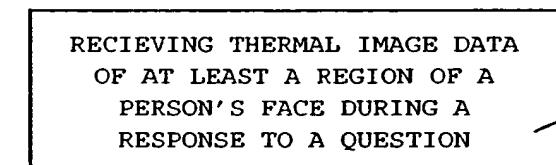Analysis & Slope Threshold Classification
for Polygraph Testing

FIG. 10

RECIEVING THERMAL IMAGE DATA
OF AT LEAST A REGION OF A
PERSON'S FACE DURING A
RESPONSE TO A QUESTION   102

DETERMINE CHANGE OF THE
BLOOD FLOW RATE OVER
TIME (e.g., slope)   104

106

CLASSIFYING A PERSON'S
RESPONSE TO THE QUESTION AS
DECEPTIVE OR NON-DECEPTIVE
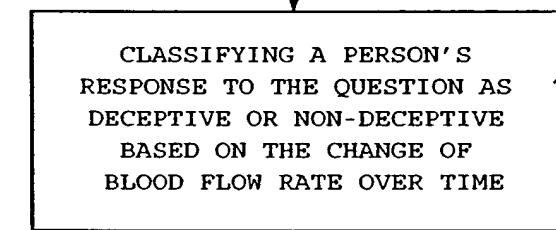BASED ON THE CHANGE OF
BLOOD FLOW RATE OVER TIME
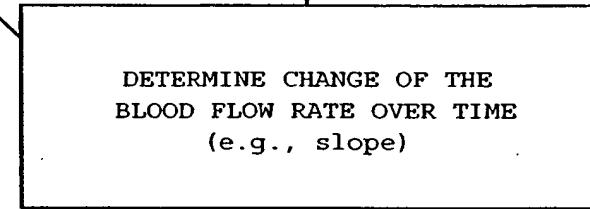
RECIEVING THERMAL IMAGE
DATA OF AT LEAST A
REGION OF A PERSON'S
FACE DURING A RESPONSE
TO A QUESTION   110

112

FIG. 11A
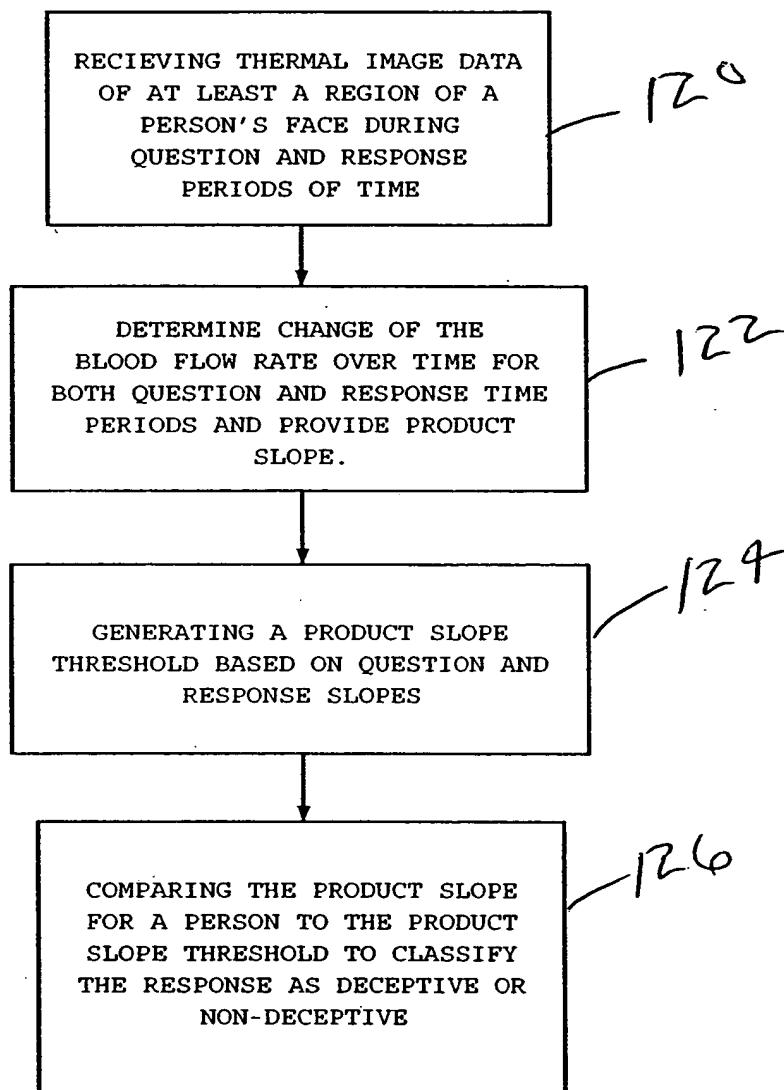
DETERMINE CHANGE OF THE
BLOOD FLOW RATE OVER TIME
(e.g., slope)

GENERATING A SLOPE THRESHOLD

114

COMPARING THE SLOPE FOR A
PERSON'S RESPONSE TO THE
QUESTION TO THE SLOPE
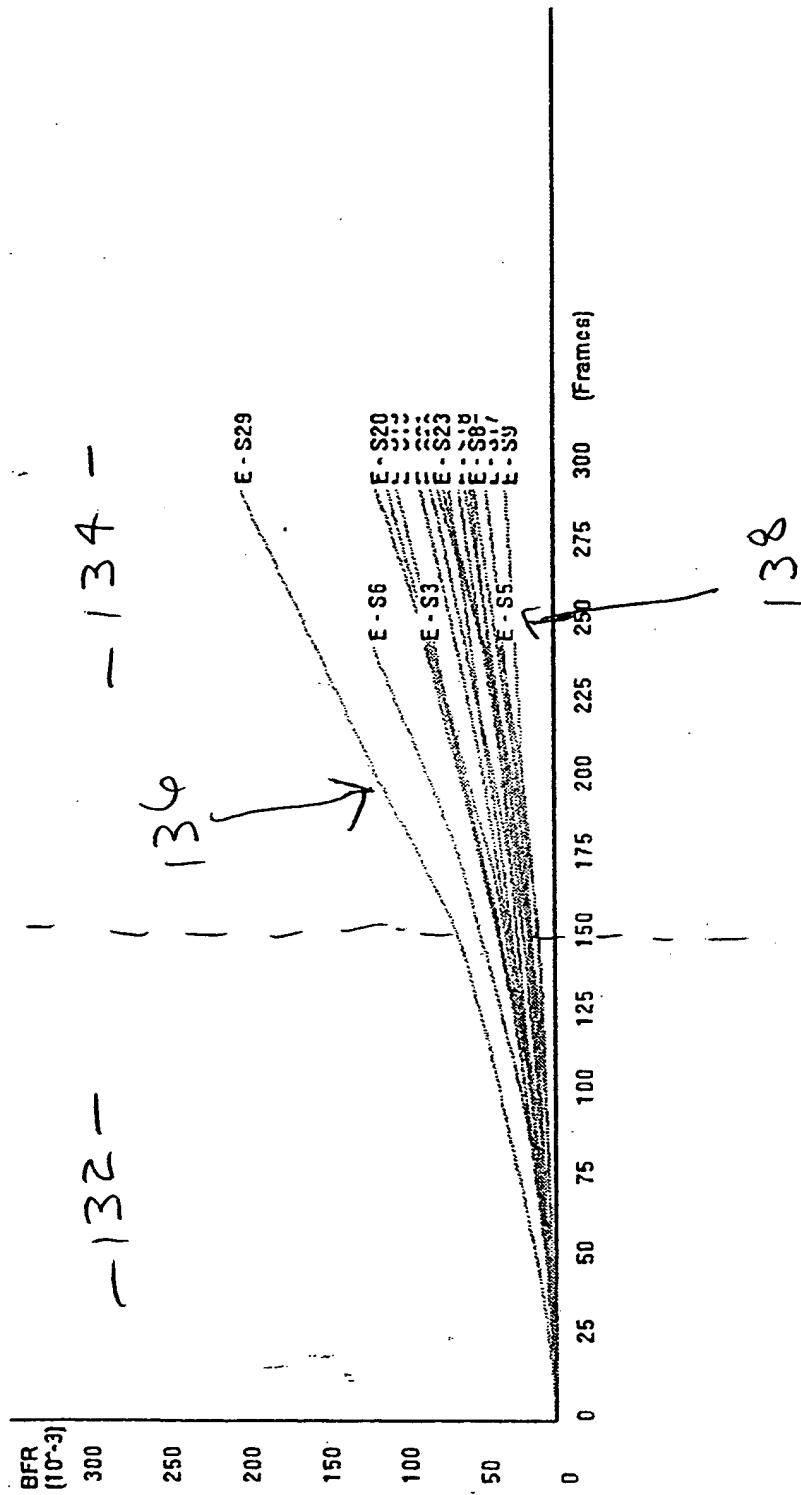THRESHOLD TO CLASSIFY THE
RESPONSE AS DECEPTIVE OR
NON-DECEPTIVE

116

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Analysis & Slope Threshold Classification
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FIG. 11B

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RECIEVING THERMAL IMAGE DATA
OF AT LEAST A REGION OF A
PERSON'S FACE DURING              ― 120
QUESTION AND RESPONSE
PERIODS OF TIME
```

```
DETERMINE CHANGE OF THE
BLOOD FLOW RATE OVER TIME FOR
BOTH QUESTION AND RESPONSE TIME   ― 122
PERIODS AND PROVIDE PRODUCT
SLOPE.
```

```
GENERATING A PRODUCT SLOPE
THRESHOLD BASED ON QUESTION AND   ― 124
RESPONSE SLOPES
```

```
COMPARING THE PRODUCT SLOPE
FOR A PERSON TO THE PRODUCT
SLOPE THRESHOLD TO CLASSIFY       ― 126
THE RESPONSE AS DECEPTIVE OR
NON-DECEPTIVE
```

FIG. 12

BFR (10^-3)

300
250
200
150
100
50
0

0   25   50   75   100   125   150   175   200   225   250   275   300   (Frames)

E - S29
E - S6
E - S3
E - S5
E - S20
E - S23

—132—
—134—
136
138